

Selective Case Finding in Syphilis Control

By GEORGE MOORE, M.D., M.P.H., and MALCOLM T. FOSTER, M.D., M.P.H.

IN VIEW of the gradual decline in the number of cases of syphilis reported by State health departments year by year, most public health authorities have been aware of the need for radar-like methods to pinpoint undiscovered syphilitics in the population. Evan Thomas (1) has suggested that when the prevalence rate of syphilis is low, blood-test screening of total populations is not entirely feasible. As the incidence of syphilis in the population decreases, the cost of finding a case by mass blood-testing increases proportionately. In recent years, mass blood-testing campaigns have been waged in many of our major cities, such as Charleston, S. C. (2), Philadelphia, Pa. (3), Atlanta, Ga. (4), Detroit, Mich., and New York City. Because of variable results and high initial costs, the more recent surveys have emphasized screening of high-prevalence groups or areas rather than entire populations. The selective approach has proved its merit; nevertheless, the campaigns have required considerable personnel, effort, and money. They have also proved to be short-range procedures, as the populations tested are usually prone to reinfection.

Several States, notably Mississippi and North Carolina, have recently become interested in long-range, selective, group-screening methods. In Mississippi (5), the State Board of Health has considered placing emphasis on the population for survey rather than on the individual. They point to surveys as an effective method of

finding cases of late and congenital syphilis at low cost. Better education is also listed as an advantage.

In North Carolina, the State Board of Health has organized a venereal disease survey team consisting of six to eight trained Public Health Service investigators. At the request of a county health department, this team arranges and conducts blood-test surveys of select-group populations. Drs. Wright and Sheps (6), of Chapel Hill, N. C., discussing screening methods, suggest that the major value of such surveys is to reduce the backlog of old cases and to prevent congenital syphilis.

Interest is being shown in the sociomedical aspects of venereal disease more than ever before, and it is natural that this interest should enter the realm of screening methods. For example, H. Garrick Williams (7) describes his experiences with blood testing in pool halls and taverns, where 12.8 percent of the persons tested were reactors. W. Lloyd Warner and associates (8) have studied syphilis prevalence and community structure, using as their material a blood-testing campaign in a Georgia town. They found 0.6 percent white and 13.6 percent Negro reactors, and determined that groups with a lower social status contributed the highest percentage of positives. The authors write, "It is important that groups of the population with higher prevalence and incidence rates be identified so that activities can be directed toward them. . . ." Other authors have pointed out the effect of socioeconomic factors and marital status on syphilis prevalence (9, 10).

This paper describes briefly three methods of screening employed by the Cumberland County Health Department during the past year. These

Dr. Moore and Dr. Foster are with the Cumberland County Health Department, Fayetteville, N. C. Dr. Moore, of the U. S. Public Health Service, is venereal disease control officer and Dr. Foster is the county health officer.

methods suggest long-range blood-test surveys, aimed at high-incidence groups, that can be adapted to most local health departments because of the limited cost and unnecessary "extras."

Diversified Industrial Surveys

From October 19, 1951, to June 15, 1952, the venereal disease division of the Cumberland County Health Department, consisting of two investigators, one clerk and the venereal disease control officer, visited 36 small industrial plants and, at semiweekly intervals, the county jail. The plants were selected for their unskilled and semiskilled employees, regardless of race, and included laundries, fertilizer plants, construction groups, city sanitation units, feed mills, coal and fuel companies, lumberyards, foundries, cement works, and brickworks, as well as the 654 county jail prisoners.

Plants employing over 50 men were not included in the survey, as arrangements had been made for the State venereal disease survey team to visit the county later. The time required for the surveys averaged about 1 hour a week for each of the four members of the venereal disease division. Thus, the survey fitted into the usual routine of venereal disease control work and caused no interruption of regular activity of the division. In fact, a diversified activity was begun which proved to be highly profitable.

A total of 1,483 persons was tested serologically in the 8-month period. Negroes comprised 57 percent of the group (the percentage of Negroes in Cumberland County is approximately 26 percent); 82 percent were males. By age, 54 percent were 15-30 years of age and 46 percent were 31 years and older. Table 1 illustrates the results of the survey.

Of the 244 positive or doubtful reactors, 221 or 91 percent have been brought to diagnosis. Eighty-six or 39 percent were found to need treatment. Twenty-six had late latent syphilis; 8 tertiary syphilis; 1 was a congenital syphilitic; and 51 were treated for early latent syphilis. It was significant that although 54 percent of the total group tested was comprised of youths between 15 and 30 years of age, the percentage of those in the same age range who

were found to need treatment was only 18 percent. Of the treated syphilitics, 82 percent were 31 years and older.

Eleven-Day Industrial Survey

From June 17 through June 28, 1952, the State venereal disease survey team invited by the Cumberland County Health Department completed a survey of the larger industrial plants (over 50 employees) in the county. All arrangements for the survey, including publicity, scheduling of plants, and conferences, had been made before the team's arrival. Schedules were presented at a short meeting with the team on June 16, and the survey began the next morning.

During the 11-day period, 2,360 serology tests were taken covering 37 industrial plants and special groups. The plants were of the same general description as listed for the first survey but also included textile mills, large manufacturing plants, and migrant fruit pickers. The composition of the group tested and the number of serologic tests for syphilis (STS) taken are shown in the accompanying tabulation.

<i>Survey group:</i>	<i>STS taken</i>
Industrial surveys.....	2,029
Migrant labor.....	49
Street surveys.....	205
Movies 3).....	77
Total	2,360

¹ 68 tests hemolyzed, or quantity not sufficient, or broken in shipment.

The group was weighted in favor of males (77 percent) and whites (56 percent). Forty-five percent of the group were 15 to 30 years old; 37 percent, 31 to 35; and 18 percent, 46 to 70. Results of the survey are shown in table 2.

By age, the group that demonstrated the highest percentage of positives for the Negro race was 31-45 (35 percent); the highest group for the white race was aged 46-70 (5 percent). The 15-30 age groups of both whites and Negroes proved to be the least infected groups. By sex, more Negro males in the 46-70 age group were infected (33 percent) than Negro females in the same age range (17 percent), showing that infected Negro females were younger than infected Negro males. Of 152

reactors that have already been brought to disposition, 88 or 58 percent have required treatment for syphilis; 3 percent were biological false positive reactions. The 88 diagnosed as active syphilis were distributed as follows:

<i>Stage of syphilis:</i>	<i>Number</i>	<i>Percent</i>
Early latent, not previously treated..	16	18
Early latent, reinfection or relapse..	10	11
Late latent, not previously treated..	15	17
Late latent, reinfection or relapse..	37	42
Congenital syphilis.....	1	1
Tertiary syphilis.....	9	10

Since "outside" personnel had been invited into the county for this survey, an estimate of survey expenses was computed. Total expense for the survey team borne by the State Board of Health was \$892.00, and for the Cumberland County Health Department, \$55.00. The cost per blood test was 40 cents and per positive serology test, \$3.73.

This survey, then, has been inexpensive in view of the high percentage of reactors found. Furthermore, as a result of the survey, familial contacts of the reactors will be found and brought to the clinic and more cases will be diagnosed and treated. The differences in percentages of positives and doubtfuls between the two surveys is probably explained by the fact that surveys of large industrial plants cannot be as selective as those of smaller plants. Differences are significant only in Negro females.

Table 1. Positive and doubtful reactors in diversified survey

Race and sex	Number examined	Reactors	
		Number	Percent
Negro:			
Male.....	724	167	23. 1
Female.....	128	54	42. 2
Total.....	852	221	26. 0
White:			
Male.....	488	12	2. 5
Female.....	143	11	7. 7
Total.....	631	23	3. 7
Male:			
Negro.....	724	167	23. 1
White.....	488	12	2. 5
Total.....	1, 212	179	14. 8
Female:			
Negro.....	128	54	42. 2
White.....	143	11	7. 7
Total.....	271	65	24. 0
Grand total.....	1, 483	244	16. 5

Table 2. Positive and doubtful reactors in 11-day industrial survey

Race and sex	Number examined	Reactors	
		Number	Percent
Negro:			
Male.....	767	175	22. 8
Female.....	193	48	24. 9
Total.....	960	223	23. 2
White:			
Male.....	915	24	2. 6
Female.....	317	7	2. 2
Total.....	1, 232	31	2. 5
Male:			
Negro.....	767	175	22. 8
White.....	915	24	2. 6
Total.....	1, 682	199	11. 8
Female:			
Negro.....	193	48	24. 9
White.....	317	7	2. 2
Total.....	510	55	10. 8
Grand total.....	2, 192	254	11. 6

Health Certification

From July 1, 1951, to June 30, 1952, data on health certificate examinations were compiled in an effort to determine the value of screening for syphilis the group required to have health certificates.

The Cumberland County Health Department's code on health certification follows closely the State rules and regulations in requiring that employees of restaurants, cafes, grills, taverns, hotels, tourist camps, trailer camps, abattoirs, meat markets, frozen-food lockers, poultry establishments, and food-processing plants be examined for infectious diseases before they are employed. The city ordinance also requires taxi drivers to be examined. State laws include examination of teachers, premarital applicants, prenatal-care patients, barbers, beauticians, cosmetologists, and welfare applicants (for training schools and boarding homes, and for placement). Certain colleges and institutions require health examinations for entrance; and domestics in private employ are required by State law to obtain a "health card."

The enforcement of the statutory laws regarding health certification is left to the health

department in all cases except the following: beverage plants and bakeries (department of agriculture); ice cream and dairy plants (both department of agriculture and health department); taxi drivers (police); teachers, barbers, and beauticians (State). Health cards must be renewed each year and may be obtained from either the health department or private physicians.

Although examination at the health department includes chest fluoroscopy and serologic test, many applicants request a blood test only from the health department and then visit their private physicians for completion of the examination.

A check on laboratory reports for the fiscal year revealed that over 5,250 residents of Cumberland County (96,000 population) requested a serologic examination at the health department for either health certification or compliance with the prenatal law; 5,190 examinees professed to have had a negative history for syphilis and were tabulated as a single group. Others who had previous records of venereal disease or who admitted previous infection were referred to the venereal disease clinic for their health cards. The laboratory data on the 5,190 health examinees who had not been reactors or syphilitics at any previous examination are shown in table 3, by race and reason for examination.

A percentage of 4.6 positives and doubtfuls for the group was considered somewhat high since nearly all the examinees professed to have had previous negative serologic tests (10 percent of the donors in the 11-day survey had had syphilis). Moreover, the group was 46 percent white and included many children, skilled workers, and professionals.

Analysis of the returned health certificate application forms, of which there were 3,703 for the fiscal year, including former venereal disease patients, disclosed a positive or doubtful reaction in 262, or a percentage of 7.1. One third of these 262 reactors were treated for active syphilis in various stages:

<i>Stage of syphilis:</i>	<i>Percent</i>
Late latent, not previously treated.....	27
Early latent, reinfection or relapse.....	42
Late latent, not previously treated.....	2
Late latent, inadequate treatment or reinfection	19
Tertiary.....	19

It is interesting to note that the largest single group of examinees (1,007) was the unemployed. This group was characterized by a high percentage of young females (86 percent) and of positive serologic tests (11 percent). In fact, there were more unemployed girls (870) who applied for health cards than there were girls who had jobs (751) in cafes, restaurants, taverns, or bars, and who worked as

Table 3. Laboratory data on serologic tests of health examinees, fiscal year 1952

Type of examination	White				Negro				Total			
	Number examined	Percent of group	Reactors		Number examined	Percent of group	Reactors		Number examined	Percent of group	Reactors	
			Number	Percent			Number	Percent			Number	Percent
Health cards (food handlers, domestics, etc.).....	1, 888	-----	23	1. 2	1, 860	-----	133	7. 2	3, 748	72. 2	156	4. 2
Prenatal-care examinees.....	83	-----	0	0	780	-----	75	9. 6	863	16. 6	75	8. 7
Premarital examinees.....	260	-----	1	. 4	75	-----	5	6. 7	335	6. 5	6	1. 8
Other (beauticians, barbers, and welfare school, and teachers' certificates).....	150	-----	0	0	94	-----	0	0	244	4. 7	0	0
Total.....	2, 381	45. 9	24	1. 0	2, 809	54. 1	213	7. 6	5, 190	-----	237	4. 6
Total, exclusive of prenatal-care examinees.....	2, 298	-----	-----	-----	2, 029	-----	-----	-----	4, 327	83. 4	162	3. 7

Table 4. Effect of marital instability

Marital Status	Nonreactors (percent)	Reactors (percent)
Single-----	21	13.3
Married-----	66	63.9
Separated, widowed, divorced, second marriage-----	13	22.8

maids, domestics, and cooks. Theoretically, a health card is held by the employer as long as his employee works for him, but an unemployed girl may keep her card until she is employed. The existence of a large military reservation in the county may explain, at least in part, the problem of the unemployed female group.

Health certification for this area, therefore, must be considered an effective method of screening for syphilis.

Efficacy of Screening Methods

In order to gain some estimate of the amount of syphilis in Cumberland County, the persons who applied for health cards might be taken as a representative sample since they include all classes, races, and age groups in the county. By adjusting this sample group to the entire county population by age, sex, race, and occupation, using the 1950 population figures, it was determined that the prevalence of syphilis in Cumberland County amounted to approximately 1,900 cases (reactors) of whom 1,440 were Negro and 460 were white.

Through venereal disease control activities of the health department and private physicians, approximately 1,230 reactors were brought to disposition during the past year. Of these, 738 (60 percent) were found by the three above survey methods—diversified and industrial surveys and health certification. Of the remainder, 295 (24 percent) were discovered through the central activities of the venereal disease division, excluding surveys, and 196 (approximately 16 percent) were diagnosed by private physicians. Thus, the 1,230 reactors represent 64.7 percent of the total estimated reactor problem in Cumberland County.

As most of the reactors in the survey had late latent and tertiary syphilis, it would seem that the three methods of screening served primarily

to reduce the tremendous backlog of previously untreated or inadequately treated syphilitics. And by screening 9,093 individuals from a population of 65,000 between the ages of 15 and 70 years, 738 reactors were discovered. In other words, screening 14 percent of the population by survey brought to light 39 percent of the estimated reactor problem of the county. This points to the efficacy of selecting certain population groups for screening techniques.

Venereal Disease, a Sociomedical Problem

Social data were obtained on persons tested in the 11-day industrial survey and analyzed in an effort to study the relationship of social instability and the acquisition of venereal disease.

It was determined that, by marital status, 21 percent of the total group (2,192 donors) were single; 66 percent were married for the first time; and 13 percent stated that they were separated, divorced, widowed, or married two or more times. The latter denotes a group with somewhat high marital instability. Whites and Negroes of both sexes showed equivalent percentages of marital difficulty.

These individuals were also questioned about history of previous venereal disease and civil court records such as felony. Ten percent stated that they had had venereal disease; 5 percent reported disfavor in court action; and 86 percent gave clear records for both difficulties. Here, a large difference appears between the races in that 19 percent of the Negroes previously had venereal disease and 8 percent reported a previous court record. These percentages for whites were 3 and 2 percent, respectively. Tables 4 and 5 illustrate the social significance of these factors on the acquisition of syphilis (reactor group).

These data suggest that marital instability is associated with multiple sexual contacts and

Table 5. Effect of promiscuity and antisocial behavior

Social data	Non-reactors (percent)	Reactors (percent)
Previous venereal disease-----	4.6	50.6
Previous court record-----	4.4	8.8
Neither difficulty-----	91.0	40.6

increased opportunities for acquiring venereal disease. Also, antisocial behavior and promiscuity (as shown by high percentages of previous venereal disease) are significant factors in the acquisition of venereal disease. The differences between whites and Negroes in antisocial behavior may account for the large differences seen in rates of syphilis between the races. This last correlation is significant statistically. A previous report from this area on venereal disease rates of prisoners also substantiates these data (11).

That this problem is not one of race per se is shown by arranging the various groups and plants tested in order of highest percentage of reactors. Unskilled worker groups contribute the most reactors and skilled laborers and professional workers, the least. College entrants (68 percent Negro) and teachers (83 percent Negro) were groups that demonstrated no positives. Furthermore, of 606 serologic tests taken of Negro freshmen at the Fayetteville State Teachers College in 1951, only 3 were positive, a percentage of 0.5.

Summary

1. Three screening techniques as employed by the Cumberland County Health Department are described. These screening measures may be adapted to most local health departments, as they aim at economy, long-range needs, and high prevalence groups of the community.

2. An 8-month period of selective screening of small industrial plants proved to be a diversified, yet highly profitable, screening method. About 17 percent of the donors were reactors.

3. Employing the State venereal disease survey team, large industrial plants were screened in an 11-day period and approximately 12 percent of the donors were reactors.

4. Health certification during the year screened 5,190 examinees who professed negative serologies prior to examination; about 5 percent were found to be reactors.

5. By screening a total of 9,093 individuals from a population of 65,000 (aged 15-70), 738 reactors were found. In other words, by careful screening of 14 percent of the population, 39 percent of the estimated total reactors in the county were found.

6. Disposition of the positive serologies found in the industrial surveys indicated a majority of late latent and tertiary cases of syphilis in the older age groups. A significant percentage of early latent syphilis was found, however.

7. Screening by health certification is an effective method of finding early cases of syphilis, as the examinees for the most part represent a high-incidence group prone to reinfection.

8. The effect of marital instability, promiscuity, and antisocial behavior on the acquisition of venereal disease is offered as a basis for selecting groups in the population for survey. Antisocial behavior, particularly, may help to explain the differences in rates between Negroes and whites.

REFERENCES

- (1) Thomas, Evan W.: Syphilis, its course and management. New York, N. Y., MacMillan 1949, p. 295-296.
- (2) Benov, Leon: Charleston County, S. C., mass blood testing program. Digest of VD Control Seminar, Region VI and VIII, Public Health Service, April 1-2, 1952, p. 31-32.
- (3) Gumpert, G., Ingraham, N. R., Jr., Burk, M. J.: VD case finding in high prevalence areas. 1. Procedures used. J. Ven. Dis. Inform., 32: 60-69 (1951).
- (4) Jolly, Jack: Syphilis testing in a high prevalence group in Atlanta, Ga. Digest of VD Control Seminar, Region III, Public Health Service, Dec. 5-6, 1950, p. 52-54.
- (5) Gray, A. L.: Education and mass blood testing an effective syphilis case finding combination. J. Ven. Dis. Inform., 31: 137-142 (1950).
- (6) Wright, J. J., and Sheps, Cecil G.: Role of case finding in syphilis control today. Am. J. Pub. Health 40: 844-849 (1950).
- (7) Williams, H. Garrick: Case finding in pool halls and taverns. J. Soc. Hyg. 38: 160-168 (1952).
- (8) Warner, W. Lloyd, Hill, M. C., Bowdoin, C. D., Rion, J. Wallace, and McCall, Bevide: Syphilis prevalence and community structure. J. Ven. Dis. Inform., 32: 157-166 (1951).
- (9) Usilton, L. J., Bruyere, P. T., Bruyere, M. C.: The frequency of positive serologic tests for syphilis in relation to occupation and martial status among men of draft age. J. Ven. Dis. Inform., 26: 216-222 (1945).
- (10) Bowdoin, C. D., Henderson, C. A., Davis, W. T., Jr., Remein, Q. R., Morse, J. W.: Socioeconomic factors in syphilis prevalence, Savannah, Georgia. J. Ven. Dis. Inform., 30: 131-139 (1949).
- (11) Moore, George: A Survey report of the VD problem in the Fort Bragg Area. Unpublished. Washington, D. C., U. S. Public Health Service, 1951, pp. 67-69.